

What is claimed is:

1. An isolated DNA molecule comprising a nucleotide sequence encoding an amino acid sequence substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, or SEQ ID NO:10.
2. The DNA molecule of claim 1, wherein said nucleotide sequence is substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, or SEQ ID NO:9.
3. The DNA molecule according to claim 1, wherein said nucleotide sequence is a plant nucleotide sequence.
4. The DNA molecule of claim 1, wherein the amino acid sequence has 245, 5283, 2490, 3963, or 4036 activity.
5. A polypeptide comprising an amino acid sequence encoded by a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, or SEQ ID NO:9.
6. The polypeptide of claim 5, wherein said amino acid sequence is substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, or SEQ ID NO:10.
7. The polypeptide of claim 5, wherein said amino acid sequence has 245, 5283, 2490, 3963, or 4036 activity.
8. A polypeptide comprising an amino acid sequence comprising at least 20 consecutive amino acid residues of the amino acid sequence of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, or SEQ ID NO:10.
9. An expression cassette comprising a promoter operatively linked to a DNA molecule comprising a nucleotide sequence encoding an amino acid sequence substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, or SEQ ID NO:10.
10. A recombinant vector comprising an expression cassette according to claim 9.
11. A host cell comprising a DNA molecule comprising a nucleotide sequence encoding an amino acid sequence substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, or SEQ ID NO:10.
12. A host cell according to claim 11, wherein said host cell is selected from the group consisting of an insect cell, a yeast cell, a prokaryotic cell and a plant cell.

13. A plant or seed comprising a plant cell of claim 12.

14. A plant of claim 13, wherein said plant is tolerant to an inhibitor of 245, 5283, 2490, 3963, or 4036 activity.

15. A method comprising:

- a) combining a polypeptide comprising the amino acid sequence encoded by a DNA molecule comprising a nucleotide sequence encoding an amino acid sequence substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, or SEQ ID NO:10, or a homolog thereof, and a compound to be tested for the ability to interact with said polypeptide, under conditions conducive to interaction; and
- b) selecting a compound identified in step (a) that is capable of interacting with said polypeptide.

16. The method according to claim 15, further comprising:

- c) applying a compound selected in step (b) to a plant to test for herbicidal activity; and
- d) selecting compounds having herbicidal activity.

17. A compound identifiable by the method of claim 15.

18. A compound having herbicidal activity identifiable by the method of claim 16.

19. A process of identifying an inhibitor of 245, 5283, 2490, 3963, or 4036 activity comprising:

- a) introducing a DNA molecule comprising a nucleotide sequence encoding an amino acid sequence substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, or SEQ ID NO:10, and encoding a polypeptide having 245, 5283, 2490, 3963, or 4036 activity, or a homolog thereof, into a plant cell, such that said sequence is functionally expressible at levels that are higher than wild-type expression levels;
- b) combining said plant cell with a compound to be tested for the ability to inhibit the 245, 5283, 2490, 3963, or 4036 activity under conditions conducive to such inhibition;
- c) measuring plant cell growth under the conditions of step (b);
- d) comparing the growth of said plant cell with the growth of a plant cell having unaltered 245, 5283, 2490, 3963, or 4036 activity under identical conditions; and

- e) selecting said compound that inhibits plant cell growth in step (d).
20. A compound having herbicidal activity identifiable according to the process of claim 19.
21. An isolated DNA comprising a nucleic acid which encodes an *Arabidopsis* 1-deoxy-D-xylulose-5-phosphate reductoisomerase that has the amino acid sequence of SEQ ID NO: 10.
22. The DNA according to claim 21, wherein said 1-deoxy-D-xylulose-5-phosphate reductoisomerase is from *Arabidopsis thaliana*.
23. The DNA of claim 21 wherein said DNA comprises the nucleic acid of SEQ ID NO: 9.
24. An isolated DNA that is complementary to the DNA according to any of claims 21, 22 and 23.
25. An isolated RNA that is complementary to the DNA according to any of claims 21, 22 and 23.
26. An expression construct, comprising a DNA according to any of claims 21, 22 and 23, wherein said DNA is functionally linked to a promoter.
27. A vector comprising a DNA according to any of claims 21, 22 and 23.
28. A host cell comprising a DNA according to any of claims 21, 22 and 23.
29. A vector comprising a DNA according to claim 24.
30. A vector comprising a DNA according to claim 26.
31. A host cell comprising a DNA according to claim 24.
32. A host cell comprising an expression construct according to claim 26.

33. A host cell comprising a vector according to claim 27.